

CLAIMS

1. A method for controlling a wiper device, detecting the position of a wiper arm on the basis of the state where the wiper arm is positioned at a reference position, and driving the wiper arm to reciprocate between an upper reversal position and a lower reversal position for a wiping operation, wherein,

when the wiper arm stops between the upper reversal position and the lower reversal position in operation, it is always started to move toward the reference position at the time of restarting.

2. The method according to claim 1, wherein,

a wiper arm stored position is arranged below the lower reversal position in the wiper device and when the wiper arm stops at a position other than the stored position in operation, the wiper arm is always started to move toward the reference position at the time of restarting.

3. A wiper device adapted to be driven by an electric motor with a speed reduction mechanism including a motor main body having a rotary shaft and a speed reduction mechanism for reducing the number of revolutions of the rotary shaft and transmitting the revolutions of the rotary shaft to an output shaft, comprising:

a wiper arm connected to the output shaft and adapted to reciprocate between an upper reversal position and a lower reversal position for a wiping operation;

a first magnetism detection element arranged so as to be located vis-à-vis a predetermined position of the output shaft

when the wiper arm is at a reference position;

a second magnetism detection element arranged at a position separated from the first magnetism detection element by a predetermined angle; and

a sensor magnet arranged at the output shaft and having a first magnetic pole and a second magnetic pole arranged in a peripheral direction and showing different polarities, both the first and second magnetism detection elements being located vis-à-vis the second magnetic pole when the wiper arm is at the side of the upper reversal position relative to the reference position, at least either the first magnetism detection element or the second magnetism detection element being located vis-à-vis the first magnetic pole when the wiper arm is at the side of the lower reversal position relative to the reference position.

4. The device according to claim 3, wherein

the first magnetism detection element is located vis-à-vis the boundary of the first magnetic pole and the second magnetic pole when the wiper arm passes the reference position.

5. The device according to claim 3 or 4, wherein

both the first magnetism detection element and the second magnetism detection element are located vis-à-vis the first magnetic pole when the wiper arm is at the lower reversal position.

6. The device according to any of claims 3 through 5, wherein

a wiper arm stored position is arranged below the lower reversal position and the first magnetism detection element is located vis-à-vis the first magnetic pole and the second

magnetism detection element is located vis-à-vis the second magnetic pole when the wiper arm is at the stored position.

7. The device according to any of claims 3 through 6, wherein,

when the wiper arm stops between the upper reversal position and the lower reversal position in operation, it is always started to move toward the reference position at the time of restarting.

8. The device according to claim 6, wherein,

when the wiper arm stops at a position other than the stored position, the wiper arm is always started to move toward the reference position at the time of restarting.

9. The device according to any of claims 3 through 8, characterized by further comprising:

a sensor for detecting the rotary angle of the rotary shaft, which sensor starts detecting the rotary angle of the rotary shaft at the time when the wiper arm is positioned at the reference position.

10. An electric motor with a speed reduction mechanism including a motor main body having a rotary shaft and a speed reduction mechanism for reducing the number of revolutions of the rotary shaft and transmits the revolutions to an output shaft, comprising:

a first magnetism detection element arranged so as to be located vis-à-vis a predetermined position of the output shaft when the wiper arm is at a reference position;

a second magnetism detection element arranged at a position separated from the first magnetism detection element by a predetermined angle; and

a sensor magnet arranged at the output shaft and having a first magnetic pole and a second magnetic pole arranged in a peripheral direction and showing different polarities, both the first and second magnetism detection elements being located vis-à-vis the second magnetic pole when the wiper arm is at one side relative to the reference position, at least either the first magnetism detection element or the second magnetism detection element being located vis-à-vis the first magnetic pole when the wiper arm is at the other side relative to the reference position.

11. A method for controlling a wiper device, driving a wiper arm to reciprocate between an upper reversal position and a lower reversal position for a wiping operation, wherein

a reference position arranged between the upper reversal position and the lower reversal position;

a lower limit position for mechanically restricting the operation of the wiper arm, arranged below the stored position; and,

when the wiper arm stops in operation, it is always started to move toward the lower limit position at the time of restarting.

12. A method for controlling a wiper device, driving a wiper arm to reciprocate between an upper reversal position and a lower reversal position for a wiping operation, wherein

a reference position arranged between the upper reversal position and the lower reversal position;

a stored position for holding the wiper arm at rest when the wiper arm is stopped, arranged below the lower reversal position;

a lower limit position for mechanically restricting the operation of the wiper arm, arranged below the stored position; and,

when the wiper arm stops between the upper reversal position and the reference position in operation, it is always started to move toward the reference position at the time of restarting;

when the wiper arm stops between the reference position and the stored position in operation, it is started to move either toward the reference position or toward the lower limit position at the time of restarting.

13. A method for controlling a wiper device, driving a wiper arm to reciprocate between an upper reversal position and a lower reversal position for a wiping operation, wherein

a stored position for holding the wiper arm at rest when the wiper arm is stopped, arranged below the lower reversal position;

a lower limit position for mechanically restricting the operation of the wiper arm, arranged below the stored position; and,

when the wiper arm is driven to reciprocate between the lower reversal position and the stored position, it is moved to the lower limit position for operation in each go and return cycle.

14. A method for controlling a wiper device, driving a wiper arm to reciprocate between an upper reversal position and a lower reversal position for a wiping operation, wherein

a reference position arranged between the upper reversal position and the lower reversal position;

a stored position for holding the wiper arm at rest when the wiper arm is stopped, arranged below the lower reversal position;

a lower limit position for mechanically restricting the operation of the wiper arm, arranged below the stored position; and,

when the wiper arm is driven to reciprocate between the lower reversal position and the stored position and if the wiper arm is driven toward the side of the reference position beyond the lower limit position, it is moved to the lower limit position.

15. A method for controlling a wiper device, driving a wiper arm by means of a motor to reciprocate between an upper reversal position and a lower reversal position for a wiping operation and controlling the operation of the wiper device by detecting the wiper arm position by means of the count value of the pulse signal output as a result of the rotary motion of the motor, wherein

a reference position for resetting the count value of the pulse signal to a reference value, arranged between the upper reversal position and the lower reversal position;

a stored position for holding the wiper arm at rest when the wiper arm is stopped, arranged below the lower reversal position;

a lower limit position for mechanically restricting the operation of the wiper arm and causing the count value of the pulse signal to show a predetermined value, arranged below the stored position; and,

when the wiper arm stops in operation between the upper

reversal position and the reference position, it is always started to move toward the reference position at the time of restarting and the count value of the pulse signal is reset to the reference value as the wiper arm passes the reference position;

when the wiper arm stops in operation between the reference position and the stored position, it is started either toward the reference position or the lower limit position at the time of restarting and the count value of the pulse signal is reset to the reference value or the predetermined value as the wiper arm passes the reference position or arrives at the lower limit position, whichever appropriate.

16. A method for controlling a wiper device, driving a wiper arm by means of a motor to reciprocate between an upper reversal position and a lower reversal position for a wiping operation and controlling the operation of the wiper device by detecting the wiper arm position by means of the count value of the pulse signal output as a result of the rotary motion of the motor, wherein

a reference position for resetting the count value of the pulse signal to a reference value, arranged between the upper reversal position and the lower reversal position;

a stored position for holding the wiper arm at rest when the wiper arm is stopped, arranged below the lower reversal position;

a lower limit position for mechanically restricting the operation of the wiper arm and causing the count value of the pulse signal to show a predetermined value, arranged below the

stored position; and,

when the wiper arm is driven to reciprocate between the lower reversal position and the stored position, it is moved to the lower limit position for operation in each go and return cycle and the count value of the pulse signal is reset to the predetermined value in response to the arrival of the wiper arm to the lower limit position.

17. A method for controlling a wiper device, driving a wiper arm by means of a motor to reciprocate between an upper reversal position and a lower reversal position for a wiping operation and controlling the operation of the wiper device by detecting the wiper arm position by means of the count value of the pulse signal output as a result of the rotary motion of the motor, wherein

a reference position for resetting the count value of the pulse signal to a reference value, arranged between the upper reversal position and the lower reversal position,

a stored position for holding the wiper arm at rest when the wiper arm is stopped, arranged below the lower reversal position;

a lower limit position for mechanically restricting the operation of the wiper arm and causing the count value of the pulse signal to show a predetermined value, arranged below the stored position; and,

when the wiper arm is driven to reciprocate between the lower reversal position and the stored position and if the count value of the pulse signal shows a value indicating as if the wiper arm were positioned at the side of the reference position beyond the lower limit position, the wiper arm is

moved to the lower limit position and the count value of the pulse signal is reset to the predetermined value in response to the arrival of the wiper arm to the lower limit position.